

4.7 Test of Dual Porosity

This test verifies that FEHM has correctly implemented the dual-porosity formulation. Figures 38, 39, and 40 show that FEHM results are in good agreement with the analytical solution for the dual-porosity simulations. The differences between the analytical and FEHM solutions can be attributed primarily to the fact that the analytical solution uses a steady-state approximation for the matrix flow (lumped 1 node) whereas FEHM uses a transient approximation (2 node) for the matrix material. The results, compared numerically to the analytical solution (found in files *dual1_out.analyt*, *dual2_out.analyt*, and *dual3_out.analyt*), are given in Table 49. The maximum absolute error for these three runs for nondimensional pressure was less than 0.021, and the percent errors were less than 0.8%. These results meet the acceptance criteria for this test suite developed in Chapter III.

Table 49. Results of the dual-porosity test			
V&V test	Maximum error	Maximum % error	RMS error
Dimensionless pressure versus dimensionless time at $r_w = 0.17528$ m			
Case 1	0.1945e-01	0.3530	0.4143e-03
Case 2	0.2070e-01	0.7086	0.5725e-03
Case 3	0.1931e-01	0.6997	0.5360e-03

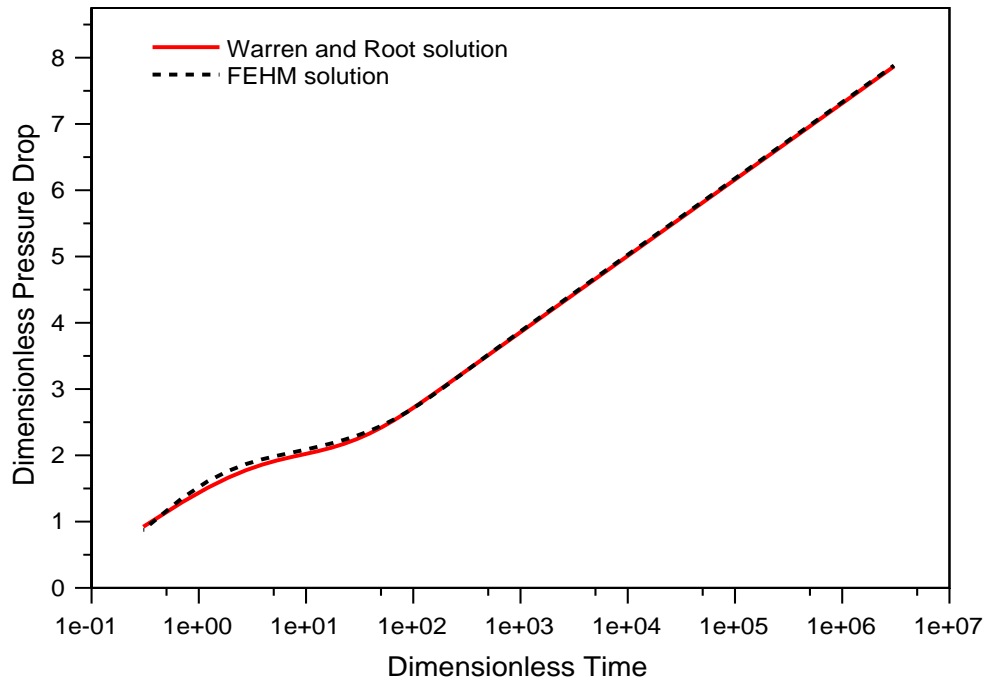


Figure 38. Comparison of FEHM and analytical solution for dual-porosity case 1, $\lambda = 0.02546$, $\omega = 0.1000$.

DRAFT 4/97

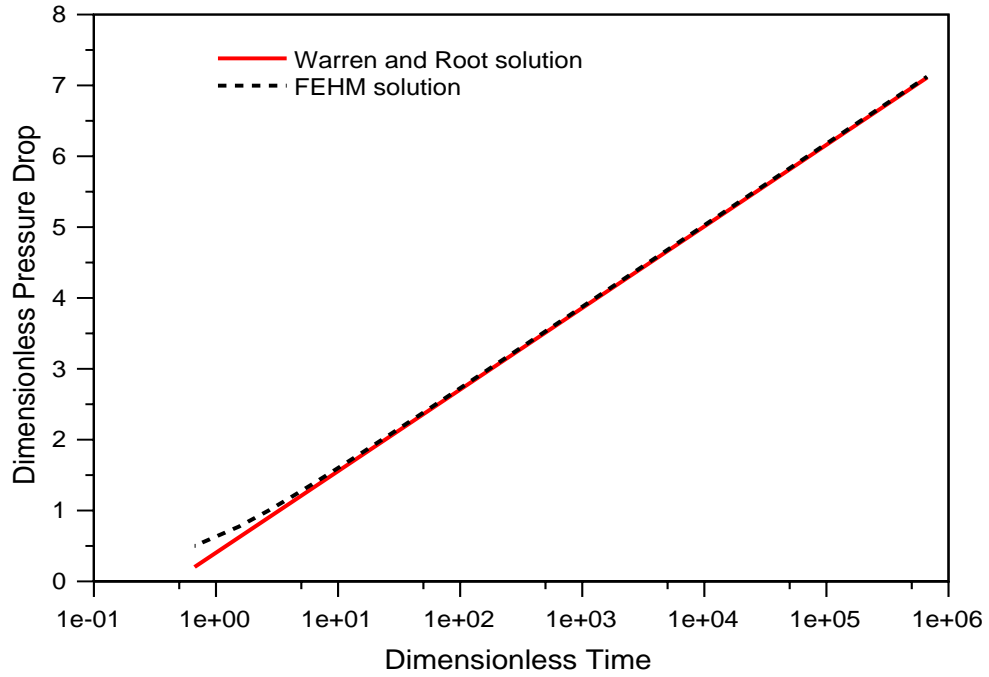


Figure 39. Comparison of FEHM and analytical solution for dual-porosity case 2, $\lambda = 25.46$, $\omega = 0.01099$.

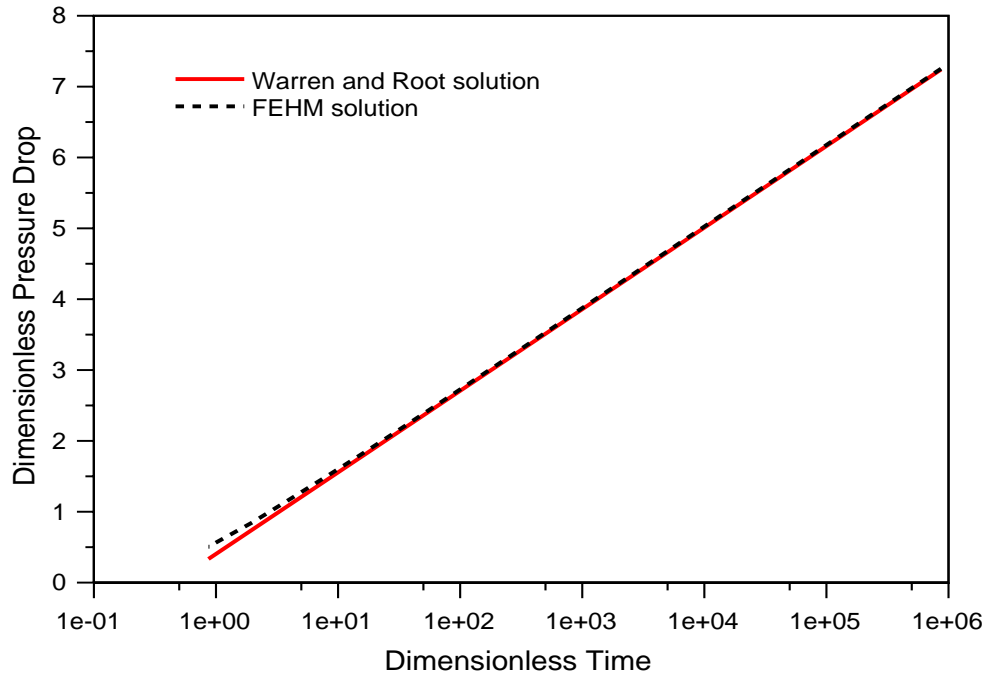


Figure 40. Comparison of FEHM and analytical solution for dual-porosity case 3, $\lambda = 164.7$, $\omega = 0.001013$.